

Chapter 2: Neural Networks and the Ascent of Machine Learning

The Questions ...

1. TRUE or FALSE: Multilayer Neural networks – the extension of perceptrons that was dismissed by Minsky and Papert as likely to be “sterile” – have instead turned out to form the foundation of much of modern artificial intelligence.

True

2. What is a network?

“ A network is simply a set of elements that are connected to one another in various ways.”

Ie. Social networks, computer networks and neural networks

3. In very direct way, answer this question: How do you distinguish a social network, from a computer network from a neural network?

A social network is composed of humans as the element being connected. Computer networks describes a series of computing machines being connected and a neural network consists of neurons being connected in a brain.

4. What does it mean for a unit of a multilayer neural network to be a hidden unit?

A hidden unit in a multilayer neural network is one that does not provide output but rather “talks” to other neurons.

5. What phrase is used to designate a network that has more than one layer of hidden units?

A network that has more than one layer of hidden units is called a “Deep Network”.

6. What is the difference, with respect to processing, of each “unit” of a perceptron and each “unit” of a multilayered neural network?

A unit of a perceptron gives either a 0 or 1. A unit in a multilayered neural network gives a number between 0 and 1 called its “activation”.

7. Define the term “classification” with respect to a multilayered neural network.

The classification is the output with the highest confidence/activation level after computation. It is the result of the neural networks layered response.

8. How do most neural network researchers determine how many layers of hidden units are needed, or how many hidden units should be included in a layer, for a network to perform well on a given task?

Trial and Error

9. In their book *Perceptrons*, Minsky and Papert were skeptical that a successful algorithm could be designed for learning the weights in a multilayer neural network. Their skepticism (along with doubts from others in the symbolic AI community) was largely responsible for the sharp decrease in funding for neural network research in the 1970s. But despite the chilling effect of Minsky and Papert's book on the field, a small core of neural network researchers persisted, especially in Frank Rosenblatt's own field of cognitive psychology. And by the late 1970s and early '80s, several of these groups had definitively rebutted Minsky and Papert's speculations on the "sterility" of multilayer neural networks by developing a general learning algorithm for training these networks. What is the name of this algorithm?

Back-propagation

10. Describe, in just a few sentences, how the standard multilayer network learning algorithm works.

The standard multilayer network learns by evaluating something, giving an output and then its margin of error is used to change the weighting used in the hidden layers in order to increase the accuracy of its evaluation next time.

11. To what sorts of applications have neural networks been applied?

Speech recognition, stock market evaluation, language translation and music composition. But it can be used for any form of data.

12. In the 1980s, the most visible group working on neural networks was a team at the University of California at San Diego headed by two psychologists. What were their names? What adjective (other than neural) did they use to refer to the networks which constituted the focus of their attention, and why did they use this qualifier? What was the name of the two-volume treatise that these researchers published in 1986?

David Rumelhart and James McClelland worked with neural networks when they were called connectionist networks because the knowledge was stored in a series of weighted connections. They published the treatise "Parallel Distributed Processing".

13. TRUE or FALSE: Over the last six decades of AI research, people have repeatedly debated the relative advantages and disadvantages of symbolic and subsymbolic approaches.

True.

14. Select the best answer: Symbolic systems ...

- (a) can be engineered by humans, be imbued with human knowledge, and use human-understandable reasoning to solve problems.
- (b) tend to be brittle, in that they are error-prone and often unable to generalize or adapt when presented with new situations.
- (c) both of the above.

B – tend to be brittle, in that they are error-prone and often unable to generalize or adapt when presented with new situations

15. In a relatively short paragraph, answer the question: What is MYCIN?

MYCIN is an expert system developed in the 1970's and given ~600 rules which would help physicians diagnose and treat blood diseases. MYCIN was able to use logic and probabilistic reasoning to make a diagnosis. It could also explain it's reasoning.

16. Select the best answer: Subsymbolic systems ...

(a) tend to be hard to interpret, and no one knows how to directly program complex human knowledge or logic into these systems.

(b) tend to be better than symbolic systems at perceptual or motor tasks for which humans can't easily define rules.

(c) both of the above.

C – both of the above

17. How did the philosopher Andy Clark characterize the nature of subsymbolic systems?

“bad at logic, good at frisbee.”

18. TRUE or FALSE: Inspired by statistics and probability theory, AI researchers developed numerous algorithms that enable computers to learn from data, and the field of machine learning became its own independent subdiscipline of AI, intentionally separate from symbolic AI.

True.

19. Fill in the blank: In rejecting symbolic AI methods, and hoping to lure others to reject them as well, machine learning researchers disparagingly referred to symbolic AI as BLANK.

GOFAI – Good old Fashioned AI

20. Identify a bit of knowledge presented in this chapter that you found to be particularly interesting, describe that bit of knowledge, and provide a few words pertaining to why you found the knowledge to be particularly interesting.

What I found interesting in this chapter is how there have been ups and downs in regards of funding and motivation for deep machine learning throughout the decades, but it has stuck around, and with different advances in hardware more possibilities are thought of. In modern times there is a lot of excitement around it.